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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/713,344

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Daniel J. Pusiol

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EXAMINER

GAKH, YELENA G

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/713,344	Applicant(s) PUSIOL, DANIEL J.	
	Examiner Yelena G. Gakh, Ph.D.	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11/05/07.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-94 is/are pending in the application.
- 4a) Of the above claim(s) 17-94 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☒ Claim(s) 1-16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 14 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>04/26/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Election of claims 1-16 without traverse filed on 11/05/07 is acknowledged. Claims 17-94 are withdrawn from consideration. Claims 1-16 are considered on merits.

Claim Objections

2.A. Claims 1-16 are objected to because of the following informalities: in claims 1, 2, 11 and 12 the words "digitilizing" and "digitilization" should be changed to "digitizing". In all claims the steps in the body of the claims should be rewritten as ing-forms of verbs: "repeating", "emitting", etc. Appropriate correction is required.

B. Claims 3-8 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Oscillating magnetic field H_1 by definition is a uniform high-frequency field, and therefore claim 3 does not further limit the subject matter of the parent claim. Claim 4 recites characteristics of the fields H_0 and H_2 , which appear to be inherent to the method of the parent claim. Claims 5-8 do not recite any active method steps and therefore do not appear to further limit the subject matter of the parent claim.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

First, the examiner respectfully requests the Applicant to rewrite the claims in accordance with US patent format by concluding the preamble of the claims with the open transitional phrase "comprising" (and deleting the expression "characterized in that ...") and listing the steps of the method in the body of the claim using ing-forms of the verbs, e.g. "applying first magnetic field, ...".

Claim 1 is not quite clear. It appears that it is missing the verb "applying" after the word "simultaneously" in step (a). The examiner suggests rewriting the expression as "and simultaneously applying second and third magnetic fields to said spins B" (see below).

Claim 1 recites "spins A nuclei group" and "spins B nuclei group". It is not quite clear, as to what is meant by this definition. Is this a group of nuclei A (B) possessing identical spins? For example, such nuclei as ^1H , ^{13}C , ^{19}F , etc. have the same spin $1/2$, but they all have different resonance frequencies and therefore cannot be detected simultaneously. The expression is not quite clear. Furthermore, quadrupolar resonance is also a magnetic resonance, which makes it unclear, as to how spins A differ from spins B.

Claim 2 is not quite clear. It is conventional to repeat acquiring the signal with the delay which allows the irradiated nuclei to relax from the excited state. Therefore, the subject matter of claim 2 is not quite apparent. Also, if the claim is supposed to recite the same steps as the parent claim, except for the relaxation delay between the pulses, it should be rewritten in a simplified form, e.g. "the method according to claim 1, wherein if the adequate signal-to-noise ratio is not reached, the steps a)-d) are repeated with incorporated relaxation delay between pulses of magnetic field H_1 , which allows spins A to return to thermal equilibrium state with the spin lattice".

Claims 3-8 do not appear to recite any active steps of the method and thus are unclear and indefinite as to which further limitations for the method they recite. It appears that the characteristics of H_0 and H_2 fields as being perpendicular with the first one being uniform and weak, and the second one being a low frequency oscillation field, are inherent to the method recited in claim 1. The uniformity of the field recited in claim 5 and the bandwidth for spins B recited in claim 6 are also seem to be conventional parameters for the nuclear and quadrupolar magnetic resonances. The same is true for claims 7-9.

From claim 11 it is not clear, as to how "application of a process of resonance excitation and off resonance detection (TONROF)" recited in the preamble of the claim differs from the method recited in claim 1. It appears that claim 1 recites "a process of resonance excitation and off resonance detection". Furthermore, the closed transitional phrase "which method consists of" contradicts the recitation of the parent claim, since according to claim 11 the method consists

only of the steps recited in the body of the claim, while according to the parent claim it comprises all the steps recited in the body of claim 1.

Claim 13 is not quite clear. What does it mean, "ends at a time conveniently selected from the successive pulses of $\pi/2$ "? This expression is not apparent.

Claims 14-15 should recite active method steps such as "applying". From claim 14 it is not quite apparent, as to how the procedure based on application of the pulse sequence can be applied to a single pulse sequence? It appears that TONROF itself is a pulse sequence. Should it incorporate strong off resonant comb (SORC) pulse sequence, rather than be applied to it? The same question arises for claim 15. Claim 15 further recites closed transitional phrase "consisting", which contradicts the recitation of the parent claim.

Claim 16 has an optional language "may be pulsed", which makes it unclear, as to whether the method comprises the steps recited in claim 16, or it does not, which renders the claim unclear and indefinite.

Potential Claim Rejections - 35 USC § 102/103

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

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3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. **Claims 1-16** can be potentially rejected over the prior art recited by the Applicant in the review by him and co-authors, "NQR: From imaging to explosives and drugs detection" (Physica B, 2007): "A very useful method to improve the SNR [signal-to-noise ratio] is the use of steady-state-free precession (SSFP) or continuous-wave-free-precession pulse techniques (CWFP) [31–34], like the strong-off-resonance-comb sequence (SORC) or the transmission on-reception off (TONROF) sequence [31,34]. The SORC and TONROF sequences have demonstrated to be very useful not only to improve SNR but also to drastically reduce the detection time [31,34]" (page 49, right column). TONROF and SORC are recited in the pending claims. The references [31] and [34], i.e. *S.S. Kim, J.R.P. Jayakody, R.A. Marino, Z. Naturf. 47a (1992), 415* and *L.M.C. Cerioni, D.J. Pusiol, Hyperfine Interactions 159 (2005), 389*, are not available to the examiner at the present time. Since the references were cited by the Applicant, the examiner assumes that the Applicant may possess these articles and respectfully requests the Applicant to submit them for the examiner's consideration in response to the present Office action. Also, although the examiner was not able to specifically recite them in relation to the rejections, the examiner believes that it would be in the interest of the efficient prosecution of the case if the Applicant could indicate the patentable distinction between the subject matter of the references disclosing the pulse sequences TONROF and SORC, which are recited in the pending claims, and the subject matter of the pending claims. The examiner would very much appreciate the Applicant's response.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yelena G. Gakh, Ph.D. whose telephone number is (571) 272-1257. The examiner can normally be reached on 9:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Yelena G. Gakh/
Primary Examiner, Art Unit 1797

4/27/2008